

Claims

1. A liquid dispensing system for dispensing liquid drops on the order of nanoliter quantities with a number of dispensers arranged in parallel for dispensing liquid on a surface at the same time, the dispensing system including a printhead for holding the liquid dispensers, a bracket for removable connection to the printhead, and a semi-kinematic mounting system between the printhead and the bracket.

2. The dispensing system of claim 1, wherein the system includes a microarray spotter.

3. The system of claim 2, wherein the mounting system includes three ball mounts rigidly mounted on one or both of the bracket and printhead.

4. The system of claim 3, wherein the printhead has a region with openings for dispensers, wherein the ball mounts surround the region.

5. The system of claim 4, wherein the region has openings along an x-direction and a y-direction, and wherein the spacing between the mounts in the x-direction and the y-direction is larger than the dimensions of the region along the x-direction and the y-direction.

6. The system of claim 3, wherein each of the ball mounts contracts two linear dowel pins, such that if the ball mount is on one of the bracket or printhead, the dowel pins being in the other of the printhead and the bracket.

7. The system of claim 2, wherein the positional repeatability error from subsequent mounting and replacing is less than 50 μm and/or 5 milliradian.

8. The system of claim 7, wherein the positional repeatability error from subsequent mounting and replacing is less than 2 microns and/or 0.13 milliradian.

9. The system of claim 3, wherein at least one of the mounts has an opening for receiving a screw passing between the bracket to the printhead.

10. The system of claim 1, further comprising a positioning system connected to the bracket, and a controller for controlling the positioning system to move along three coordinate axes.

11. The system of claim 2, further comprising a positioning system connected to the bracket, and a controller for controlling the positioning system to move along three coordinate axes.

12. The system of claim 1, wherein the positional repeatability error from subsequent mounting and replacing is less than 50 μm and/or 5 milliradian.

13. The system of claim 12, wherein the positional repeatability error from subsequent mounting and replacing is less than 2 microns and/or 0.13 milliradian.

14. A microarray spotter including a printhead, a bracket, and a mounting system between the printhead and the bracket, the mounting system being sufficiently precise to provide repeatable accuracy within 50 microns along the three translational axes.

15. The microarray spotter of claim 14, wherein the repeatable accuracy is within 2 microns along the three translational axes.

16. The microarray spotter of claim 14, wherein the mounting system constrains movement in three translational directions and three rotational directions.

17. A microarray spotter including a printhead, a bracket, and a mounting system between the printhead and the bracket, the printhead for holding dispensers for dispensing liquid onto an array with wells no more than about 9 mm apart, the mounting system providing sufficient locational accuracy so that the printhead can be repeatedly removed and replaced from the bracket without requiring further calibration.

18. The microarray spotter of claim 17, wherein the wells are no more than about 4.5 mm apart.